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BOARD OF AGRICULTURE NOTICE

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	Pure Bred.	Cross Bred.	Pure Bred.		Cross Bred	
			Boar	*Sow*	*Boar.*	*Sow.*
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	Trio.	Boar.	Sow.
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A number of complaints have been received, particularly from the country districts, that would-be readers of the "Journal" are unable to obtain copies. Our system of distribution has been made as complete as possible but the demand at many centres has so exceeded the supply that some disappointment has been inevitable We would point out, however, that by the simple method of

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JOURNAL
OF THE
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OF
BRITISH GUIANA.

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THE EAST COAST FARMERS COMPETITION, 1920.

This competition, which has not been held for some years, demonstrated several salient points relative to the present condition of farming on the East Coast of Demerara.

First and foremost it is clearly evident that little, if any progress has taken place. Why? There are several reasons.

For one, as the Official Report which is reproduced in these pages points out, a more remunerative and easier occupation has been found in Sea Defence work—comparatively high rates of pay and ready money must form attractions almost irresistible to a man who has, perhaps, a five mile walk to and from his farm each day before he can commence work thereon and a possible final prospect of total loss through drought or inundations.

This counter attraction, however, diminishes, as the works near completion.

For another, bad seasons have undoubtedly played havoc of late with these farms. Heavy and continuous rains have been experienced coupled with droughts of no mean severity.

A further point which because glaringly apparent in the adjudication of these plots was the peculiar lack of

1330 26 MAY 1926

appreciation of that most fundamental principle of agriculture in this Colony—namely drainage.

Instance after instance was encountered where every prospect was good and pleasant to behold except the drains which were either choked with grass, only half dug or almost invisible owing to their not having been dug for a long period of time.

Mention has been made above of the distances which separate these East Coast farmers from their lands. It is absurd that almost half a day should be wasted, the better half of a morning's energy consumed before an East Coast farmer can take up either fork or shovel and commence to work on his farm!

The remedy is obvious, yet there is no instance of any one individual exercising his individuality and attempting to adopt such a remedy.

However, indications are not lacking that the future is not without promise. Agricultural Associations are active in many centres and what is more they are fully appreciated. No longer are they regarded (to quote the Resident Agricultural Instructor for the Coast) "as a body of men meeting month after month and talking impossibilities about the tilling of the soil."

MEETINGS OF THE BRITISH GUIANA SUGAR PLANTERS' EXPERIMENT STATIONS COMMITTEE FROM JULY, 1920, TO DATE.

At a meeting of the British Guiana Sugar Planters' Experiment Stations Committee held on Monday, 12th July, reference was made to the apparent discrepancies in the acreage returns under farmers canes on which the contribution by the Government to the Experiment Stations was based, the Committee requesting the Chairman to write to the Town agents of the various sugar estates asking them to obtain from their respective managers estimates of the acreages occupied by farmers canes on their plantations, and if possible, the acreage

cultivated by other cane farmers sending cane to their mills.

The question of drainage for Sophia was discussed at some length. It was decided that the services of an engineer be sought with a view of obtaining advice as to the specifications for a pump and equipment to be erected if found necessary. The Committee arranged to pay a visit of inspection to the Cummings Canal to decide upon the feasibility or not of natural drainage being obtained by means of this canal. A letter from Messrs. Curtis Campbell & Co. in reply to the application from the Committee for the lease of the additional 60 acres at Sophia was read. Permission was granted therein pending a reply from their Principals, for the Committee to have the land cleared if they found it requisite to do so. The meeting decided under the circumstances that no steps could be taken until a definite reply had been received by them from this firm. At this meeting it was decided to offer the post of overseer for Sophia Station to Mr. C. Cameron.

At the meeting held on the 9th August, statements of expenditure to date and estimates of expenditure for year October 1920 to September 1921 were considered. The question of drainage for Sophia was again discussed. It was decided that plans and tenders for the erection of drainage kokers be obtained. The meeting decided that the question of mechanical means of doing work should not be lost sight of in connection with the working of the Station. They had seen excellent examples of work performed by manual labour, but that was not sufficient. They hoped that it would soon be possible for experiments in mechanical tillage to be carried out. The Committee were notified that Mr. C. Cameron had accepted the post of overseer and had assumed his duties from the first instant. The Committee considered that the time had arrived when the organization of the staff should take place and recommended that the necessary regulations be drafted by the Chairman and Superintendent and submitted to the Committee for their approval.

It was decided to allow the labourers at Sophia to

erect a limited number of dwellings on the Station, the site for these would be decided upon by the Superintendent who would see that they were erected to conform with existing Government regulations. The estimates for the coming financial year were next considered, when in view of the large initial expenditure, it was proposed that the assessment be fixed at $1 per acre.

A meeting was held on Friday 10th September when a draft of the regulations governing duties of the Staff of the Experiment Stations was gone through and passed with slight amendments. Regulations relative to sick leave and vacation leave were likewise dealt with and passed. Statements of Expenditure to date were laid for consideration by the Committee. The Estimates for the coming year were considered. The Committee expressed its intention to make a start with the other stations, expenses in connection with which were provided for in the estimates. After a final discussion, the estimates were passed and the Secretary instructed to write to the British Guiana Sugar Planters Association for permission to assess at the rate of $1 per acre.

At a meeting held on 18th October, it was decided to await the arrival in the Colony of Mr. Craig before entering into the final agreement for the lease of the additional acreage. The Committee arranged to meet at Sophia on Monday, 1st November, to decide on the site for the intake koker and other matters. On this date the Committee met and decided on the site for the intake koker. They approved of the employment of a clerical assistant by the Superintendent. With regard to the employment of a chemical assistant they recommended that enquiries be made in Barbados for a competent young man to fill this post.

At a meeting held on 6th December, at which Mr. A. E. Craig was present, the terms of the agreement with Messrs. Curtis Campbell & Co. for the lease of the additional 60 acres were mutually decided upon.

The Committee were informed that efforts to secure the services of a chemical assistant for the Station were so far unsuccessful.

BOTANICAL, PLANT DISEASES AND PEST NOTES.

SUGAR FROM REEDS.

The following note from SUGAR *published in September, 1920, is of interest. It well illustrates the ingenuity and resourcefulness of the Teuton and also gives us cause to wonder whether the large areas of swamp lands in British Guiana which contain quantities of Reeds such as the well known 'Bizzy-Bizzy' (Cyperus articulatus) might possibly be made useful especially as we observe that some of the European Reeds have been found to contain in their Roots "a greater sucrose percentage than some cane varieties regularly planted for sugar production." Also that "a ton of Reed Roots will give about a quart of good alcohol, while under further treatment, a Rum of excellent quality is obtained. By proper treatment with other ingredients, it was possible to manufacture a heavy, dark coloured beer, resembling in taste and appearance porter beer.":—*

In the course of a series of experiments with plants known to have a comparatively large quantity of carbohydrates in their sap, investigators recently tested several species of reeds which grow in abundance in ponds and rivers of Northern and Central Germany. It was found that, while the reeds themselves showed no sucrose whatever, the roots were exceedingly rich therein, containing in fact, a greater sucrose percentage than some cane varieties regularly planted for sugar production. According to the analysis made, reed roots contain 7·15 per cent. of albumen, 29·56 per cent. of sucrose, 25·49 per cent. pentosanes, and 30·30 per cent. fibrous materials.

The surprisingly high contents in sucrose naturally arrested the attention of all chemists throughout Germany, and many further analyses were made, as soon as the result was published, with the idea of checking up this discovery. But additional experiments only confirmed the first analysis, and arrangements are now being made to utilize the inexhaustible supplies of reeds for the manufacture of sugar and other products allied thereto. One of the important features of the proposition is the com-

paratively cheap labour of pulling reed roots from the muddy bottoms of rivers and ponds. Ploughs of special construction have been designed for this purpose.

Experiments made with these roots show that, not only can sugar be extracted from them in a commercially feasible manner, even under pre-war sugar conditions, but industrial alcohol can also be manufactured without a single change in the equipment required in alcohol distillers using corn husks, potatoes, and other materials. A tion of reed roots will give about 60 quarts of good alcohol, while under further treatment, a rum of excellent quality is obtained. By proper treatment, with other ingredients, it was possible to manufacture a heavy, dark-coloured beer, resembling in taste and general appearance porter beer.

It has also been found that the resulting mash yields still another product, called 'fragmit," which has been found to constitute an excellent food for horses when mixed with oats, while in its unmixed state it is a good food for cattle and pigs.

FAIR EXCHANGE.

The following extract from the 'Agricultural News' is interesting as the now notorious 'Congo Weed' (Antidesma sp)—an importation into this country—has established itself fully as an agricultural pest. Antidesma, as far as we know, is not attacked by any particularly injurious disease or pest though such may, in course of time occur, even as has happened to Clidemia hirta in Fiji We note that Clidemia hails from British Guiana, which constitutes, perhaps, an exchange with the outside world for the 'congo weed':—

In a note published in the "Agricultural News" for May 3, 1919, attention was drawn to the danger attending the introduction of uncultivated plants from one country to another. The case in point was that of *Clidemia hirta* a native of the West Indies and British Guiana, which when introduced into Fiji became an agricultural pest.

An interesting sequel to this story is now to hand in the first number of the new "Agricultural Circular,"

January, 1920, issued by the Department of Agriculture Fiji.

Reports were received that *Clidemia hirta* was being killed by a disease. Investigation showed that diseased areas were widespread and occurred chiefly on the poor red soil overlying the soapstone, rarely on the richer alluvial flats, and more frequently in open country than in the bush. The affected patches were very conspicuous, generally occurring on hillsides or hilltops where the plants had the appearance of being very badly windswept, or even at times of having been over-run by fire. The patches were usually clear-cut, as if radiating from a centre of infection.

Individual plants were found to be dying-back from the tips, and the roots to be in a very unhealthy condition. Very few rootlets were present—those that remained bore small nodules—and the larger roots also were frequently swollen. In the dead twigs beetle borings often occurred, and in all parts of the plant fungus mycelium was found. In the nodules, in specimens from several districts, nematode eggs were found, apparently belonging to the genus Heterodera.

Appearances led to the conclusion that the primary cause of the diseased condition was the nematode. The various fungi found enter through wounds made by the nematode, and may cause more serious damage, judging by the fact that on one estate where fungi were most abundant, the disease was most marked in its effect.

The practical importance of the disease is that in the areas affected the Clidemia is dying out, and valuable crops, such as paspalum and reeds are replacing it.

As an experiment, diseased plants of Clidemia have been planted in close proximity to certain plots of cultivated crops. Even should the nematode prove harmless to these particular crops, however, the idea of employing it generally to exterminate Clidemia is not one to be encouraged. Both nematodes and root fungi are serious enemies of economic plants, and should the Clidemia parasites transfer their attacks to some cultivated crop the results might be very serious.

A MOSQUITO SURVEY OF TRINIDAD.

The following Review of a valuable Report to which, unfortunately, we have not access, we reproduce from the 'Agricultural News.'

The Report has recently been submitted by Dr. C. F. Lassalle, Deputy Surgeon and Medical Inspector of Health of Trinidad and Tobago to the Trinidad Government. Editor :—

The surveys on which this report is based were made during two periods—between March 15, 1914 and April 30, 1915, and again from July 1917 to December 31 of the same year. The surveyors were all qualified sanitary inpectors with special training in anopheles survey work, and with a practical knowledge of measures for mosquito eradication. District Medical Officers exercised a general supervision over the work of the inspectors, inspected their diaries once a week, and forwarded their weekly reports, with observations on the same, to the Surgeon-General. The special instructions to the Inspectors contained the following :—

'1. A detailed search must be made for collections of water. Every collection of water, and every receptacle liable to collect water (holes in trees, water-retaining plants) should be carefully examined. Whenever larvae are found, specimens should be collected and bred out for the identification of the species.

'2. Notes must be made at the time of the particulars of the breeding places—nature and extent, sources of the water, the use, if any, to which the water is put, etc. The methods by which the breeding places might be got rid of or controlled should also be considered and noted.

'3. Low-lying ground or irregular flat lands adjacent to high ground, which become or are liable to become flooded during the wet season, should be examined, and the character, extent, etc., noted.

'4. Diagrams of the district, as accurate as possible, should be made, showing with reference to an index:—

(a) Breeding places, distinguishing between permanent, temporary, and potential.

(b) Villages estates, houses, settlements, with the approximate distances from breeding places.

(c) Main line of drainage, and roads.

'5. As far as practicable the habits of mosquitoes should be studied. Houses should be examined, and notes made of the distance from breeding places.

'6. A diary must be kept of the work done, and a summary made at the end of each week.

'7. On completion of the survey, a connected report should be written up, comprising the facts ascertained, and a general description of the physical characters of the district.'

There were employed on this work five inspectors during the first period, and eight during the second. Four of the inspectors were employed during both periods. From the instructions to the inspectors the nature of the survey work is plainly to be seen.

The body of Part 1 of the report gives records of the surveys of the different districts in Trinidad and Tobago, showing the nature of the mosquito breeding places, and giving recommendations for the improvement of the conditions with regard to mosquito control. Pages 43 to 51 give general observations, summary, and recommendations.

Several sectional sketch maps showing breeding places in different localities are included in Part 1. On these maps breeding places are indicated as permanent, temporary, and potential, and the breeding places of some of the most important malaria-carrying mosquitoes are indicated.

The sketch map of Trinidad at the end of Part 1 indicates where mosquito breeding places were found throughout the island.

In the chapter of general observations, summary, and recommendations, the list of breeding places of anopheles which were found during the course of the survey is of interest.

The most important result obtained by the survey has of course been the relation of breeding places to towns and villages, and other considerable centres of population. The districts which were found to be most infested were Chaguanas, Caroni, Oropuche, and La Brea in Trinidad, and Roxborough, Tobago, all well-known malarious localities.

The ideal breeding grounds of anopheles here, as in other countries, are natural collections of water protected from strong light, and renewed by fresh supplies.

The propagation areas found in the course of the survey may be summarized as follows: 1—Slowly running water courses, streams and rivers. 2—Seepage water. 3— Pools and ravines. 4—Ponds, lagoons, swamps. 5—Brackish waters. 6—Low-lying, swampy and grassy lands. 7—Rice fields. 8—Shallow wells and water holes. 9—Mosquito breeding places produced by man: (*a*) borrow pits at the sides of roads and railway lines; (*b*) tapia holes, *i.e.*, holes from which clay has been obtained for building huts; (*c*) culverts—if badly laid. 10—Earthen street and road drains improperly graded or blocked. 11—Water containers, such as old disused coppers, etc. 12—Hoof prints of cows and horses especially in pastures. 13—Wheel tracks of wagons or carts.

Although other species have been found commonly breeding in the stems of plants, the two species, *Anopheles albipes* and *A. argyrotarsis*, which convey malaria in the colony, have not been found breeding in such places.

Remedial Measures.

Under this heading, the following statements and recommendations are given:

'When malaria can be practically extinguished in such a place as the Panama Canal Zone, the same thing can be done anywhere else. Gorgas's fundamental principles in order of importance are:—

'(1) The habitat of anopheles during the larval stage is destroyed with in a hundred yards of dwellings,

since the larvæ of this mosquito live only in clear, fresh water which is plentifully supplied with grass and algae.

(2) All protection for the adult mosquito must be destroyed, since the adult is weak on the wing, not generally flying far, and needing plenty of grass and bush for protection against the wind.

(3) All habitations are screened, but effectively, for screens as ordinarily put up without expert supervision are of little use.

(4) Where breeding places cannot be destroyed by drainage, the larvæ must be destroyed by means of crude petroleum or some other larvicide.'

These principles are not difficult of application, and all remedial measures should be based on them.

Measures for the eradication or reduction of anopheles mosquitoes may be grouped under the following headings:—1—Filling of pools, depressions, swamps. 2—Drainage (agriculture). 3—Oil or petrolization. 4—The use of larvicides. 5—Natural enemies. 6—Cleaning bodies of water. 7—Screening of houses and destruction of adult mosquitoes in houses.

Limitation of space will not allow of comments on all these points, but some of them deserve special mention. For instance, it is stated that 'proper drainage is the most effective method of eliminating malaria,' and again, 'it has been proved in other countries that agricultural operations are powerful antagonists of malaria, and that the disease is reduced or banished from low-lying, unhealthy places in proportion to the thoroughness and efficiency of those operations.'

Proper drainage depends on the right construction of drains, and their maintenance in such a manner that while surplus water is promptly removed, there are no pools or obstructions in which small quantities of water remain as mosquito breeding places. Drainage is fundamental in low-lying lands or in any moisture-retaining soil, as a requisite for agriculture, and such operations as ploughing or forking the surface soil tend to make it porous, and to allow water to penetrate instead of remaining on the surface.

The natural enemies of the adult mosquito are stated to be dragon flies and bats; and reference is made to the recommendation that has been put forward in some countries to encourage the breeding of bats on a large scale. In such cases, in addition to the reduction of mosquitoes, there would be quantities of bat guano available as a fertilizer.

The natural enemies of the mosquito larvae are the larvae of the dragon fly, and several kinds of small fish, esqecially 'millions,' 'ganbin,' 'sardine,' and 'coscorobs.'

The writer of the report draws attention to the fact that in typical anopheles pools and water collections the larvae can easily escape from the fish among the growth of algae, grasses, and other vegetation. These fish are of but little use in controlling mosquitoes, except in water fairly free from vegetation, and with clean, smooth sides and borders.

As for rice fields, which are of importance and cannot be abolished, methods are suggested for reducing the danger of malaria from these. No settlement should be allowed in the rice field, and houses shonld not be nearer than 200 yards on the windward side, or 400 yards on the leeward side of the rice fields. Experiments with fish should be carried out, and trials should be made in the periodical drying-out of rice fields, which, it is said, may be done in such way as not to injure the crop.

The general summary of recommendations is given below :—

1. All surface drains in villages should be properly graded to a suitable outfall into the nearest watercourse or into the sea, and concreted as far as funds may permit.

2. Unpaved earth drains or ditches should be kept free of vegetation, and where small pools of stagnant water form and cannot be drained, oil should be applied to the surface regularly once a week.

3. All low-lying, swampy lands near villages and at a distance of at least 400 yards should be filled in or drained, or both, as found necessary.

4. All useless, shallow wells and ponds should be filled in; until they can be so dealt with they should be regularly oiled once a week.

5. Wherever practicable a pipe-borne constant water-supply should be introduced in every village. This would render it possible to do away with shallow wells and water holes, as well as cisterns and tanks.

6. Wherever such a supply is not possible, the efficient screening of all water receptacles should be secured; advice and instruction in the cheaper methods of screening and, if necessary, the enforcement of anti-mosquito bye-laws would have the desired effect.

7. Borrow pits should be filled in, or, where very extensive, efficiently drained towards the nearest water-course.

8. No new borrow pits should be made anywhere in the neighbourhood of residential settlements, *e.g.*, villages, and estates, unless provision is made for thorough drainage.

9. The current of streams should be accelerated by the regular removal of obstructions, *e.g.*, vegetation, debris, etc., and the courses being straightened and properly drained wherever possible.

10. In the vicinity of villages and estates, water collections which cannot be immediately dealt with should be oiled once a week, or fish should be put into them.

11. Legislation for drainage of swamps and lagoons wherever injurious to health.

12. The early making of anti-mosquito bye-laws, similar to those now in force in urban districts, applicable to all rural districts.

This must be considered as an extremely valuable report—valuable not only as showing what the mosquito conditions in Trinidad and Tobago are, and what means may be taken to make effective a campaign for the greater improvement of conditions in that colony, but also, what is perhaps still more important, as setting an example which ought to be followed in each and every island of the West Indies and British Guiana where mosquito-borne diseases, especially malaria, are prevalent. Indeed, when one considers the amount of inefficiency and the loss of available

effort in the West Indies during the past twenty years, although the relations of mosquitoes to malaria as well as the means of mosquito control have been well known, it seems remarkable that surveys such as that described in the report under review, should not have been carried out in all the West Indian colonies long before this time.

DORMANCY IN SEEDS.

The problem of dormancy in seeds is probably one of the most perplexing in the whole of plant physiology. It is common knowledge that many seeds, after detachment from the parent plant, pass through a period of rest, during which they fail to germinate even under the most favourable conditions of moisture, and oxygen supply, and temperature. Such seeds can often endure the withdrawal of water and dry up, remaining alive sometimes for many years. It is obvious that such seeds cannot be described as dead, since they may retain their capacity for germination for several years. A seed may fail to germinate immediately after harvesting, owing to a state of dormancy in the embryo itself or because of the nature of the seed-coats. The dormancy in the embryo, is due to the need of further ripening processes, which may conveniently be designated after-ripening. More usually, however, the dormancy is due to the seed-coats, which may prevent germination by inhibiting the absorption of water, or mechanically preventing the expansion of the embryo. The seed-coats may also prevent germination by interfering with the absorption of water, or the elimination of carbon dioxide. Soaking in acids is often effective in forcing such seeds, either through modifying the colloids of the seed-coats or changing the reaction of the embryo. Other forcing agents which are often successful in shortening the period of dormancy are freezing, exposure to high

temperatures, desiccation. It is interesting to note that Johnson grass (*Holcus halepensis*) germinates best after exposure to alternating temperatures, whereas the closely allied Sudan grass (*Holcus halepensis sudanensis*), requires a constant temperature; while removing the pulp from camphor seeds may hasten germination of these seeds by two weeks.

Some observations of Kondo on the after-ripening of rice may be of interest. The rice was harvested at intervals in its growth designated as the milk, the yellow ripe, the fully ripe, and the dead ripe stages. Seed harvested in the milk stage was found viable, but to be lacking in vigour. Storage for about fifteen days after preliminary drying, or for a month without drying, resulted in quite satisfactory germination. The germination of the yellow ripe grain was also markedly improved after from one to three months storage. Fully ripened grain germinated quite well immediately after harvest, but showed greater viability a month later. Dead ripe grain germinated very readily immediately after harvest, and was not materially benefited by storage. Grain stored in a dry condition completed the ripening process much more rapidly than that stored without preliminary drying, but the latter showed greater viability and vigour. The storage of the unripe grain in the panicle was found to be detrimental in many cases to after-ripening.

Information or this nature is clearly of the greatest value; it is to be regretted that more information is not available concerning the behaviour of West Indian seeds. The possibility should not be overlooked, however, that some of the seeds of these islands may pass through a period of secondary dormancy. That is to say, the seed may be capable of germination immediately after harvesting, but may subsequently pass into a quiescent period, after which it may again be viable. The loss of vitality in seeds is of course a matter of the greatest importance. Rubber seeds for instance, very rapidly lose their viability, thus rendering their transport from one country to another extremely precarious,—*Agricultural News*.

FORMALIN AS AN INSECTICIDE.

The following, as, particularly interesting with respect to mosquito control, is reproduced from *The Field*, August 14, 1920.

According to an announcement in *The Times* of July 22, M. Roubaud, of the Pasteur Institute of France, has discovered that powdered formalin sprinkled on the surface of water in which mosquito larvæ are present, is a sure means of destroying them, and hence of reducing the risk of malaria. The method by which the specific is said to act is interesting. The habitual food of mosquito larvæ consists in minute solid particles and hence they ingest the particles of powdered formalin. These latter give off gaseous formalin in sufficient quantities to poison the larvæ which have swallowed grains of solid formalin. The reflection immediately arises, may not this specific be used in horticulture for the purpose of destroying other pests? It would certainly seem likely that this preparation of formalin may prove a valuable addition to the list of stomach poison insecticides. It is to be hoped that tests will be made in this direction, and also to ascertain whether in its solid state formalin may not prove even more efficacious as a soil sterilizer than it is in the liquid form.

HOUSE FLIES AND FORMALIN.

In the *Journal of the Jamaica Agricultural Society*, August 1920, it is stated that the most effective fly killer is formalin. Half a teaspoonful in a saucer full of water, coloured with milk or sweetened with sugar, will kill thousands of flies per day, Two or three such baits placed about the house are most effective. Although many flies may not be seen in the bait or flying close by, yet, if close attention is paid, many will be found on the floor; they may even fly outside, and then fall. The bait should be renewed every morning.

Trials made with this bait have not given satisfactory results in British Guiana. Much better results were obtainted by the use of flypapers, a formula for the preparation of which was published in a previous number of this Journal.——L.D.C.

NOTES ON FUNGI.

Smut of *Indian Corn* (*Ustilago Maydis*).—During recent years the growing of Indian Corn (Maize) has been more popular in the Colony than hitherto; and to-day, though there is no extensive cultivation of this crop in any part of the Colony still it is grown on a small scale by many farmers in different districts.

The attention of cultivators, is, therefore, drawn to the above-named fungus disease. Though this "pest" is not known to cause damage on an epidemic scale, nevertheless when it does appear, it should receive prompt attention on the part of the cultivator. Hence it is necessary that the farmer should be able to readily identify the "smut," and adopt measures for its control.

Not infrequently corn plants are seen with swellings (locally called "boils" or "bumps") on the leaves, and more usually, on the ears. These growths have, at first, a dull grey covering; later, when this cover is ruptured, innumerable black spores are set free. These spores are capable of directly infecting other corn plants as a result of the wind distributing the spores. Moreover, it is known that the spores are capable of producing infection, when the conditions are favourable, even after they have been dormant for months, and probably years.

Obviously the diseased ears are a direct loss; but the point of real danger is in neglecting to collect and burn diseased ears, and other affected parts, before the spore masses burst. It is not enough to cut out diseased parts and scatter them on the ground; nor should they be deposited in manure heaps or cattle pens. Such practices only intensify the trouble and lead to further infection.

As regards ears for seed purposes, only good ears should be used and these should be selected from disease free fields.

It is possible, even though considerable care be exercised, that spores may be present on the seed. Where a new area is being planted with this crop from seed obtained from an outside source it is advisable to disinfect the seeds before planting by soaking them in a weak solution of copper sulphate (1%).

Red Rot of *Sugar-Cane* (*Colletotrichum falcatum*).—As a prefatory observation—because apparently many tropical agriculturalists are uninformed on the point—one might remark that the sugar-cane (*Saccharum officinarum*) is a cultivated grass. It belongs to one of the largest orders of flowering plants, the Gramineæ, an order comprising upwards of 3,000 species, including the well-known Devil's Grass or Behama grass (*Cynodon dactylon*).

Sugar-cane, like most cultivated crops, is subject to many diseases, some where the malady is comparatively easy to determine, and others where the origin of the affection is more obscure. The affection commonly called red-rot is found in practically every country where the sugar-cane is grown. Loss from this disease is not always apparent, because in some instances there are no obvious external symptoms to be seen in the growing canes.

Generally, however, there are certain external symptoms which lead, on further investigation, to an accurate diagnosis of red-rot. It commonly happens that the intermediate leaves on a shoot show signs of withering The withering generally commences at the apex of leaf, or leaves, and develops on the margins, the mid-rib remaining normal. When the disease is well established in a shoot or stool, all the leaves present a dry and withered appearance.

Further examination, especially by cutting the shoots longitudinally and inspecting the basal internodes, reveals a marked reddening of the tissues. The food vessels (vascular bundles) of the shoot show the discolouration very distinctly, and very often the pith is similarly discoloured. Not infrequently the red-coloured portions are interspersed with white transverse bars, and this condition is distinctive of this affection.

When the disease is in an advanced stage, the pith shrivels, elongated depressions form on the rind, and the canes become very light.

If canes in this condition are examined, small spore masses may be found on the surface on the shoots, near the nodes. The spores are eventually scattered by the

wind and form one of the sources of infection for other canes.

However, so far as is known, the above method of infection is comparatively unimportant, because of the paucity of spores formed.

The chief source of infection is where the disease is carried over in cane "cuttings," i.e. cane "tops"; in other words, the planting of unsound "tops."

Another source of infection is that following wounds in the cane-shoots. In this Colony the cane borer is responsible for a good deal of this trouble. Such wounds give access to the wind dispersed spores alluded to above. It might be thought that diseased "tops" would not germinate or "spring" (the term used locally). This is not so. If the 'tops' are only mildly infected they "spring" quite well, the fungus apparently remaining dormant until the canes are about one-third grown. It is then that the parasite asserts itself and this is probably corelated with the sugar content of the cane. A seed will not germinate unless conditions are suitable; the same is true of the red-rot fungus. When food is available it becomes aggressive and kills the cane.

As regards the control of this disease, some points are quite clear. The primary requirement is to use sound 'tops.' Careful selection of the 'tops' should always obtain, and responsible persons deputed to make the selection. The 'tops' which show a red-discolouration at their cut ends should be rejected. Further, the ends of the 'tops' should be clean cut and not jagged, so as to present a minimum surface only to destructive organisms.

It will be seen that the course of red-rot disease being what it is, the practice of long continued ratooning has its dangers. This applies particularly to areas where red-rot is known to be generally present.

This disease, as indeed all diseases, requires careful and intelligent supervision. Judicious handling in the initial stages will often avert incalculable future trouble.

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AGRICULTURAL NOTES.

The following extracts from Reports by Governor Storm Van Gravesande and Sir Robert M. Schomburgh concerning the cultivation of Rice, the grazing of cattle and the discovery of pitch in Guiana are of very considerable interest and constitute in all probability the earliest references to such matters in official documents.—Editor.

Extract from Governor Storm Van Gravesande's Report to the Zeeland Chamber, June 19, 1750.

The English colonies on the islands and in North America furnish convincing proof what can be done by care of and attention to population; these colonies are not only in a position to maintain themselves but can moreover, in time of war, inflict serious blows upon their enemies (as was proved by the capture of Cape Breton), and far from being a burden upon their mother country they are of great advantage to the latter; this fact being generally known requires no further comment.

If the Netherlands colonies on this continent were populated to the same extent they would not only be able to do the same but more, since the regions occupied by us in South America have many advantages over those in North America, as can actually be proved. But to adduce only one example. The English colony in Carolina derives most of its revenue and support from the cultivation of rice, whereby several planters have from very small beginnings become large capitalists. The soil in our colonies produces rice of much better colour and size than that of Carolina and it has this important advantage over it; whereas in Carolina it takes a year to grow each crop, five months only are required in Essequebo so that here twelve crops can be obtained against five in Carolina. Again, the rice in Essequebo has not the red husk which gives so much trouble in Carolina to get off. It is no doubt for these reasons that the English in Bar-

bados (to whom they are well known) are making so much stir and using so many arguments to dissuade and frighten off those desirous of undertaking this cultivation well foreseeing what injury this would do to Carolina), wherein they have until now succeeded only too well.

EXTRACT FROM SIR ROBERT H. SCHOMBURGK'S DESCRIPTION OF BRITISH GUIANA, 1840—p. 105.

The cultivation of rice would prove a véry productive branch of husbandry; and it has formed of late years a principle article of food for the labouring population, it is of great importance that it should be cultivated in sufficient quantities, if not for export, by all means for the internal demand of the colony, which does not employ the resources which she possesses to produce food for her inhabitants. The all-engrossing object, the cultivation of sugar, has for several years usurped thousands of acres which were formerly dedicated to the production of plantains, once the chief food of the labourer. The land on the coast is no doubt well adapted for the production of rice but we will not encroach upon the soil at present planted with sugar-cane. There is a tract between the rivers Berbice and Essequebo, in 4° 20' N. latitude, which nature itself appears to have designed for the growth of that article. It possesses the means of constant irrigation and at the first subsiding of the periodical inundations, when the soil is left like soft mud, the seeds might be put in. The banks of the river Berbice are here so low, that irrigation might be easily procured even in times of great drought. I am fully persuaded in my mind that two crops of rice might be procured annually; indeed it is on record, that a Mr. Rielstein, who cultivated this article on a small scale at the lower Essequebo, raised repeatedly three crops in a year. The cultivation of rice would thus cover thousands of acres which are at present a perfect wilderness; and food for the lower classes would be provided, which is at present mostly imported from a foreign country, which perhaps, at an earlier or later date may be at issue with Great Britain, beside that the rice procured from the United States is raised by slave labour.

Cattle Ranching in the Rupununi District and in "the Extensive Savannahs Between the Rivers Berbice and Demerara."

Extract from Sir Robert Schomburgk's Description of British Guiana, 1840—p. 89.

Savannahs Adopted for Grazing Grounds

The sand-hills are followed by savannahs, which generally extend to the first rocky belt, and are sometimes interspersed with woods and rivulets. They are most extensive between the rivers Demerara and Berbice; they are also frequent between the latter river and the Corentyne; but these must not be confused with those of the Rupununi, which are sterile. The former are clothed with nutritious and wholesome grasses, and in consequence of the number of springs and brooks, and the thickets of wood with which they are interspersed, it appears as if nature herself had pointed them out for the pasture-ground of thousands of cattle and horses. Those between the rivers Berbice and Demerara occupy upwards of three thousands square miles, and the favourable circumstances that they are plentifully watered by tributaries of the Demerara and Berbice and interrupted by wood-land to afford shade during the heat of the day, enhances their value as grazing grounds.

Fitness of Savannahs Between the Rivers Berbice and Demerara for Grazing Grounds.—p. 115.

I alluded in former remarks to the fitness of the extensive savannahs between the rivers Berbice and Demerara, for grazing grounds, and that they are much superior for that purpose to those of the Rupununi. The climate in these regions is uncommonly healthy; and the country so

well watered by springs and rivulets, that the great want of water which exists in the savannahs of the Rupununi and which is such an obstacle that I fear they will never be inhabited by Europeans or their offspring, is here entirely set aside. If, therefore enterprising colonists should cultivate pasturing-grounds, and stock them with cattle from the savannahs of the Rio Branco, fresh beef might be had an equally cheap rate as in the United States: it will then be in the power of the peasantry of British Guiana to provide themselves with fresh meat at a price which bears a relative value to their wages.

Proposed Plan of Leading the Cattle at the Savannahs at Rio Branco to the Coast.

The difficulties which might be connected with leading the cattle at the Rio Branco, to those savannahs between the Rivers Demerara and Berbice, are comparatively few. They might be led across the savannahs to the foot of the mount Makarapan, where they might be embarked in bateaux or large canoes, which had been constructed for that purpose in the vicinity of Makarapan. The forests in these regions abound in crabwood; and if for the transporting of the cattle the period is chosen when the river is full, the cataracts are of little consequence: the large cataracts of the Orinoco are at that period passed in vessels of forty tons. The administrator of the Brazilian cattle-farms at the Rio Branco informed me, while staying at fort Sao Joaquim, that the number of cattle amounted to about five thousand, and that the price was six dollars per head. The pasture of the savannahs of the river Berbice being similiar, and the localities and supply of water superior, to the savannahs of the Rio Branco, the success of farms which were stocked with that cattle would be ensured.

GUIANA PITCH.

EXTRACT FROM GOVERNOR STORM VAN'S GRAVESANDE'S REPORT TO THE ZEELAND CHAMBER, JUNE 19, 1750.

On the sea shore are found waves of a kind of bitumen that can be employed as tar, and being quite as good is known as Barbados tar, for it is in general use there.

CULTIVATION OF THE CASTOR OIL PLANT.

The castor oil plant does well in light alluvial loams, well supplied with organic matter, but in thin, clayey soils, and in sandy soils, the growth of the plant is slow, and its seed production is small.

The plant roots deeply, and the ground must receive a preliminary digging to a depth of from 8 to 10 inches, followed by a harrowing and raking. The longer the land is allowed to lie broken and exposed to the air before sowing, the better.

Fresh seeds from healthy plants germinate readily provided the soil is sufficiently moist. Seeds which have been kept for some time should be softened by immersion in water for a few hours, or a preliminary steeping in a weak disinfectant solution might be useful.

Seeds of the small annual varieties are sown 3 feet apart, or better still, if a subsidiary crop of ground nuts is interplanted, at distances of 2 feet on rows 4 feet apart. The seeds of perennial varieties are usually sown at distances of 6 feet each way, but in the case of large branching plants, wider spacing is perhaps advisable.

As the castor seedling bears transplantation badly, the seeds are planted straight away in the fields. In some cases, however, as many as 10 per cent. have been observed to die in the second month, probably owing to the

presence of eelworms in the soil. Such infested soils should not be planted with Ricinus, but, should the discovery be made too late, it is advisable to have a number of seedlings apart in bamboo baskets, to fill the vacancies, after creosoting the earth at the spot.

After germination, no more watering need be given, except in the case of actual drought. No further care is required, except weeding, and keeping watch for caterpillars which must be kept down by hand picking, and by insecticide sprayings.

The castor oil plant can be interplanted with advantage with other annual crops, preferably the ground-nut (*Arachis hypogaea*) which besides being in itself a very creditable crop, has the advantage of supplying to the soil some of the nitrogen which the castor oil plant takes out of it.

As the castor oil plant exhausts the soil, it should not be cultivated twice in succession on the same ground. A period of at least two years should be allowed between two crops, and it is necessary to devise a scheme of rotation embracing a series of quick growing field crops.

The rotation, Ricinus, ground-nut, gingelly, sweet potatoes, is suggested, these crops being adapted to similar physical conditions of soil. After the sweet potatoes, manuring would be necessary, but as the products of the crops themselves, ground-nut cake, castor cake, etc., provide most of the substances required, the cost of manuring is practically reduced to that of application. Although the castor oil plant is considered to be an exhausting crop, much of the plant food it uses can be returned to the soil in the form of ashes, or better still, in the form of a compost.

Picking of the capsules should begin when the calyces turn from green to brown, and the yellow husks become visible. The fields should be gone over once a week, and the operation may last over two months, or less, if maturity

is hastened by hot, dry weather. The practice of allowing the capsules to ripen, and drop their seeds to the ground, is only admissible where the Ricinus is grown as a pure crop, and the ground is clean and free from weeds.

—*Garden's Bulletin, Straits Settlement.*

HOW TO SELECT DESIRABLE EARS OF CORN FOR SEED PURPOSES.

There are two distinct steps in corn selection. One is to select the most desirable ears, using neither measurement nor score card. The other is to take the ears first selected and judge each one very carefully, noting on a previously prepared score card the value of each character. The first step, which consists simply in picking out the most desirable ears from the crop after it is harvested, does not require much time, but it is one which no farmer can afford to neglect. At the same time these questions should be kept in mind: Will it germinate? Is it pure—that is, will the kernels when planted produce ears of the same size, shape, color, etc.? Is it the shape desirable? How much will it yeild? The following directions will be helpful in determining the approximate value of an ear by looking at it:

Will it germinate? If in doubt; test it. Look for—

Moldiness.—Discard all ears that are the least bit moldy, or that look as if they will not dry out without becoming moldy.

Ripeness.—Discard all ears on which the kernels are very wrinkled, dull in color, or discolored

Insect injury.—The principal dangerous insect is the weevil. A few weevil burrows may not cause much damage, but if corn is much weevil-eaten, the germination will be impaired.

Is it pure? Look for—

Uniformity of kernels.—Discard all ears having kernels of different color; also all ears having many small or undeveloped kernels, or, in general, kernels or different size.

Color of cob.—The cob should be of the same color as the grain, unless difference in color is known to be a variety character.

Is the shape desirable? Look for—

Straightness of rows.—Discard all ears on which many of the kernels are irregularly arrange; also ears on which the rows are very crooked.

Butt.—The butt should preferably be covered with kernels to the extent that a cavity is left after the ear is broken off the stalk. The kernels should retain their size and shape well toward the butt.

Tip.—The tip should preferably be entirely covered with kernels. The circumference of a short ear measured 1 to 2 inches from the butt and 1 inch from the tip, should not differ more than 1½ inches between the points measured. The pointed ear has too many irregular-shaped kernels at the tip resulting in low yields.

[H]ow much will it yield? Look for—

Length of ear.—Discard all ears less than 7 inches long. If there are enough desirable ears over 8 inches discard all the shorter ones.

Circumference of ear.—An ear 7 to 7½ inches [l]ong should be at least 6¼ inches in circumference [b]ut not more than 7 inches. An ear 8 to 9 inches [lo]ng should be at least 6½ inches in circumference, [an]d a length of 9 inches and up calls for a circum[fe]rence of 7 inches and up.

Depth shape and space of kernels.—Deep rectangular kernels placed so close together that they can not readily be moved by passing the fingers over them, are sure signs of high yield.

Weight of grain.—Fifty average well-shaped kernels will weigh about 1 ounce. An ear containing 14 rows with 40 well-shaped kernels in each row will have 560 kernels. This would be at least 11 ounces of grain for planting. The irreglar-shaped kernels at butt and tip should not be planted. *Circular No 18, Porto Rico agricultural Experiment Station.*

The Correct Method of Planting Banana and Plantain Suckers.

The majority of the farmers on the East Bank, Demerara River have a fair knowledge of the proper depth at which banana and plantain suckers should be planted both in the presence and absence of water in the proximity of the surface of the soil. They pay, however, but lttle attention to the correct method of planting these suckers so as to minimise destruction by wind when they commence to fruit.

Banana or plantain suckers should be planted at least 12 feet apart and with as light a "bottom" as possible In digging the holes for the reception of the suckers the earth that is removed should not be utilized for filling in the hole after the sucker has been placed in position. A supply of surface soil should be used and it is better to expose the original soil to the action of sun and air before it is again used.

When the plant is about five months old the surface of the soil as far as the leaves shade should be lightly forked. This practice causes the plant to thrive better and attain a large girth with consequent productiveness.

The 'hollow arch' portion of the sucker should, when the sucker is planted, be turned in the direction of the prevailing wind. This should especially be done when no wind break is present or on pegass lands. This prac-

rice causes the plant to put out its branches towards the wind which gives increased stability and consequently saves the expense and work entailed in bracing.

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DISTRICT AGRICULTURAL INSTRUCTOR.

SUGAR AND ALCOHOL FROM THE NIPAH PALM.

The Nipah palm (*Nipa fruticans*) is one of the very few tropical plants which occur in pure stands over extensive areas in Borneo. In common with many other palms, its sap contains sugar and laboratory experiments conducted at the Bureau of Science, Manila, indicate that production of sugar from Nipah palm sap would be a commercial success. According to these experiments it is estimated that there would be at least 12 per cent. of recoverable sugar in the sap, and the average annual yield of 4,000 gallons of sap per acre of Nipah under management should produce about 4,000 pounds of sugar.

Although the production of sugar from the Nipah sap is still in the experimental stage, the manufacture of alcohol from the same source is a well established industry. For many years the natives of the Philippines have been producing a low grade distillate averaging about 25 per cent. alcohol, which has been used as a beverage. Lately the crude stills which produced this distillate have largely been replaced by modern distilleries, of which seventy-five were in operation in 1913. These produced 2,500,000 gallons of distilled spirits. Over 98 per cent. of this production is diluted and used for beverages, and the balance utilized as fuel for lamps, stoves and motors.

The Nipah palm grows in dense formation on tidal areas throughout all of the eastern tropics. Very extensive areas are to be found in Borneo, and the British North Borneo government estimate that at least 300,000 acres exist at very accessible points throughout their territory. One block of 57,000 acres has already been surveyed on the west coast and certainly another 100,000 acres can be reached within four hours by launch from Sandakan on the east coast, and the same can be said as regards Tawau on the east coast, but further south.—*Bulletin No. 3. Forestry Dept., British N. Borneo.*

COLONY BIRDS IN RELATION AGRICULTURE.

No. 1. The Kiskadee (Pitangus Sulphuratus.)

BY F. STELL. ASSISTANT GOVERNMENT BOTANIST AND MYCOLOGIST.

Visitors, as well as residents of the Colony, soon learn to know this bird by its loud piercing call-note; in fact the call-note is responsible for the common name of the bird. Names derived in this manner are said to be on a matopeic.

The distribution of the kiskadee is quite general. In the streets, at the stellings, about the trenches, in private gardens and open spaces; indeed the kiskadee asserts itself everywhere. Similarly in the wide expanses of the hinterland, the Kiskadee is a prominent member of the bird life, especially in the vicinity of human habitations.

Kiskadees—for there are several species—belong to a group of birds which is commonly called Tyrants.

Upwards of thirty species of this class are present in the Colony and the term is no misnomer, a casual observer will detect that the kiskadee is an assertive, pugnacious bird, with a decided domineering manner.

A close acquaintance shows us that the bird has a disproportionately large head and bill and reminds one of the King-fisher. The length of the bird is about 7½ inches from tip to tip of beak and tail. The plumage is distinctive and well-defined. The breast, vent and under-wing feathers are bright yellow; the wings, back, and tail brown; primaries and tail feathers have a margin of reddish brown. Another conspicuous feature is the black head with a white ring or corona. The chin also is white. Altogether, the Kiskadee is handsome and hardy.

The kiskadee is no epicure. Scarcely anything comes amiss. Not infrequently it may be seen swooping upon its prey of fish. At other times it reminds one of the fly-catcher, so adept is it in catching insects on the wing. The refuse of the kitchen makes it a good meal; and the young of the other birds stolen from the nest are a favourite dish. Thus with its varied diet of flesh, seeds, insects

and fruit, the kiskadee maintains its place in the category of bird-life.

The nidification of the Kiskadee affords little of a striking character. Considering the size of the bird, the nest is large. It is usually built high on some tree and is quite conspicuous. The nesting material is grass. A point to be noted is that the nest has a roof, the entrance being at the side. Three eggs are laid. These are creamy white in colour, spotted with grey and brown.

A question of great economic importance is the relation of animal life to agriculture; this applies to bird-life no less than to the other phyla of animals. In the state of nature, undisturbed by human agency, the balance of nature is maintained. Each animal, and each group of animals, has its enemies by the unceasing operation of natural agencies, equilibrium is sustained.

It is a truism that all animal life on the earth is dependent on the vegetable world. Similarly, the vegetable world is dependent on bird life. If there were no birds the swarms of insects would devour all the vegetation and hence all animal life—and there would be no one left "to tell the tale."

The fact of the matter is, that man by his agricultural operations has both improved and impaired nature's workings. The improvement is shown in cultivated crops, fruits, etc ; on the other hand, the weakness, is that man, by his agricultural work, has upset the Balance of Nature.

The question then arises, what is the ideal to be aimed at by the agriculturist ? Surely it is to secure maximum crops with the least expense. Now the establishment of any plantation involves an artificial arrangement; in other words, a disturbance of the balance of nature. This being the case, it behoves the planter to make use of any and every method which will aid him to rid his lands of pests.

Indeed the utilization of natural enemies, insects, birds etc., is probably the most economical and effective method known.

In this respect the presence and encouragement of birds which feed on insects that are responsible for huge losses to crops, is worthy of consideration.

BUXTON AND FRIENDSHP FARMERS ASSOCIATION.

The Eight Agricultural, Live Stock, and industrial Show.

By E. M. Morgan.
Resident Agricultural Instuctor,
Belfield, East Coast.

The Eight Agricultural, Live stock, and Industrial Show of the above Association was held on Tuesday, 26th October 1920, at the Friendship Wesleyan School Room under the auspices of the Board of Agriculture.

During the year the weather was very unfavourable, but in spite of its peculiarities a fairly successful attempt has been achieved by the association. The number of exhibits were far below that of previous years due principally to the weather as above stated. The importance and far reaching effect of these shows are not yet perfectly realized by the small farmer. This was patent, for the small number of fruits and vegetables exhibited were actually from the same house-hold.!

The quality of the exhibits was satisfactory, this shows a step toward the improvement of cultivation. It is regrettable that more attention is not being paid to the cultivation of fruits, especially those of the citrus variety. Citrus varieties when properly cultivated do well and give remunerative returns and it is be hoped that more attention will be given to this variety of fruits.

The exhibits of Poultry and Cattle were also not numerous, they were on the whole fairly good; with greater interest thrown in this direction a keener competition should be aroused.

The Needle and Fancy-work Section was excellent; the delightful manifestation of locally made hats from leaves and grasses deserve every encouragement.

At one time the Board of Agriculture placed at the various show centres a stand of exhibits not for competition. The object of this was to indicate to the farmer how to exhibit and collect fruits and vegetables, not only for exhibition but also for placing them on the market. It also aimed at giving practical instructions to farmers as to the far reaching benefits derived by selection of seeds and plants. Associations at that time were looked upon by the small farmer as composed of a body of men meeting month after month and talking impossibilities about the tilling of the soil. Happily this doubt of the past is removed by untiring efforts and village associations are now flourishing with good, earnest, and hard working men, who are not only tilling but putting into practice the lessons learnt from time to time by the Board's exhibits.

Our farmers have got to keep before their minds eye that good cultivation, sanitation, and care are necessary principles to be recognised for successful results. From the recent display, it is clear that were it not for the prolonged drought which has, and is still affecting the crops the judges would have had a difficult task as far as vegetables were concerned.

It is to be hoped that farmers will not lose sight of the fact that shows are held principally to give practical instruction and that the monetary gain acts only as an encouragement. Each and every one should avail themselves of the opportunity to be present and so learn the great lessons taught; for it is at these shows the greater number of persons have learnt that our fruits, vegetables, and Economic Products could be converted into various kinds of food as Preserves, Meals, Starch, etc.; besides it serves as healthy rivalry among farmers and gives an impetus to the sluggard who eventually awakes and feels that he should do likewise.

The Board having given all these encouragements, has played a most important part in convincing and bringing back to the associations all those who stood aloof.

Since there is a tendency to improve, the executive officers of village associations will have to excute greater diligence in preparing the prize list. Sufficient time in all cases should be given so that all interested will be able to make early preparation.

The prize list which has been the same every year, should offer additional encouragement towards the cultivation of other crops. In the various classes of the above show many items of importance were left out. Class A. Fruit section—should include Jack Fruit, Peach, Limes, Pomegranate, the two varieties of pine—Monserrat and Water etc. Class B. Vegetables: Giant and Horse Plantians. The different cultivated Yams, two varieties of Tannias, white and yellow, Eschallots, Black eyed peas, Green and dried etc: and Class C. Economies—Tapioca, the varieties of Cassareep, Fibre, Ropes, Wines and many other preserves. Adequate arrangements should also be made for garden plots, Fruits and Economic Plants from selected seeds in pots or baskets. These are all considerations for the future and if adopted will undoubtedly create livelier interest.

FIVE MINUTE CHATS WITH FARMERS.

By Rev. Eric R. O. Robertson.

Dissatisfaction and discontent were never so strongly in evidence among the farmers of the country as they are now. Bitter complaints from farmers of every race reach me almost every mail. What makes it sad is the fact that my correspondents do not belong to the class of grumblers who fill one sometimes with a feeling of disgust. Many of them are men who are making good, honest, industrious, ambitious men, who have won the respect and confi-

dence of their fellowmen. The truth is there is reason for the discontent they feel. Here is a letter from a young fellow who is now employed in the city. He left his farm because it could not pay. He went under with others owing to the drought last year. He writes to ask what hope there is for an Irrigation and Drainage Scheme this year. His loans last year amounted to 200 dollars and he sees no chance of being able to get through another year unless Polder Authorities are formed. So the youths and farm labourers are leaving the farms for the more attractive life of the city. They may as well. As a matter of fact what have they to look forward to.? It has becone a painful necessity to me to encourage our ambitious young men to emigrate to the United States and to Cuba or anywhere else where they have a chance to live. After all whether a man dies roasted alive in a kerosene box or by slow starvation it is still death only in one case there is the joy of looking for it and in the other he cannot even make a fight of it. Here is another query, contained in a letter received from a canefarmer.

Would you advise me to go on with my canefarm now that sugar has dropped so low? I should like to say that unless cane-farmers are given better treatment, at least, a portion of the offal crop it would be impossible to carry on except at a loss. The matter is at present engaging the attention of the Conference and farmers would do well to follow the discussion that is taking place. I will state the position of the Canefarming Associations. They contend that the most satisfactory system of payment is the gallon system; that there should be a revision of the basis of payment and such a revision should guarantee to the farmer at least half the value of his crops with half the value of the offal. The Planters have with one or two exceptions shown an admirable spirit and the indications are that the inequalities and injustice of the present system will soon be a matter of the past.

The Committee investigating this matter are now awaiting the report of the Planters Association. My

advice to you is go slowly. Keep your eyes open and watch what the big man is doing, when he tangoes you tango too. Keep step with him.

The most difficult question so far that I have to deal with is that of one of the best men of this country. In a letter to me dealing with the Corentyne Irrigation and Drainage Scheme he asks whether I am satisfied that the farmers of this country need expect salvation in their present evil state judging by the action of the Government and the Electives in refusing by a solid vote to help on any Irrigation or Drainage Scheme of whatsoever character. He points out that the amount raised to carry on the administration of the country has increased during the last five years by half a million dollars and every penny of that money has been raised. He mentions the cost of the Sea Defences and the millions it took. As soon as it is a question for the improvement of the masses we are told there is no money. I am bound to confess that the future is hopeless until the people take matters in their hands. I am a politician but I know that the curse of this country and much of its backwardness is due to party politics where all are for themselves and none for the State.

AVOID HEAT.

One of the causes for corn going bad when stored for keeping is because it is put up hot from the sun. If one thrusts one's hand into a barrel of corn put up in this way, a considerable amount of heat will be felt. Sometimes the corn becomes so hot as to crumble away. Care should always be taken, after drying the corn in the sun or in a drier, to let it cool thoroughly before storing it.—*Journal of the Jamaica Agricultural Society.*

REPORT ON EAST COAST FARMERS' COMPETITIVE PLOTS.

We have the honour to submit the following report on the judging of the East Coast Farmers' Competitive Plots at Nabaclis, Victoria and Anns Grove-Clonbrook Sections, which was held on the 8th, 9th and 10th instant.

2. Considering the extent of these village lands, the number of entries at each section was very small, and it is the opinion that general agriculture is not progressive along this portion of East Coast due to the fact that the farmers are at present more or less attracted to the Sea Defence works by high rate of wages and ready money.

3. The few plots inspected, however, were generally well planted and well-kept and showed marked improvement in regards to the cultivation of plantains and root-crops. The great fault at the time of inspection was the weediness of the small drains and in one case the re-digging of the small drains was not completed. This brought the percentage of marks below the standard of 100%. The Fruit Plots inspected were poor. The cane areas consisted of very fine specimens. These did not obtain full marks from the fact that the small drains were not quite clean.

4. The following table gives the results of the judging :—

Total Marks=100
General Cultivation=50 : Drainage=50

Name.		*Marks.*		*Total.*	*Village.*	*Prize.*
C. Adams	Canes	40	45	85	Victoria.	$10 00
Edward Barry	,,	40	35	75	Nabaclis.	8 00
Edward Barry	Provisions	50	30	80	Nabaclis.	14 00
W. Baptiste	,,	45	30	75	Nabaclis.	12 00
James Fraser	,,	30	30	60	Anns Grove.	8 00
Edward Barry	Cassava	45	30	75	Nabaclis.	6 00
Marcus Ned	,,	45	30	75	Anns Grove.	6 00
W. Baptiste	,,	20	20	40	Victoria.	2 00
W. Baptiste	Coconuts	45	30	75	Nabaclis.	6 00
Joseph Andrews	,,	45	30	75	Nabaclis.	6 00
C. Adams	,,	40	30	70	Victoria.	4 00
A. C. Baptiste	Fruit Trees	20	15	35	Nabaclis.	1 00

JUDGES :—

Sgd. G. E. BODKIN, Assistant Director.
A. A. ABRAHAM, Horticultural Superintendent.
F. M. MORGAN, Resident Agricultural Instructor, East Coast, Demerara.

The Director,
Science and Agriculture.

THE EFFECT OF FOOD ON FLAVOUR.

For Iceland, according to the *Journal of the Royal Society of Arts,* there is but little pasturage especially during the winter and at this season the sheep near the coast descend to the beach and climb the rocks in search of seaweed on which they feed. This diet affects the flavour of the mutton however.

It would be interesting to know whether a diet of limes, common to stock in some parts of British Guiana and the West Indies) similarly affects the subsequent meat.

AMENDED BOARD OF AGRICULTURE ORDINANCE.

Ordinance No. 27 *of* 1920.

AN ORDINANCE to repeal and re-enact with Amendments the Board of Agriculture Ordinance, 1910. A.D. 1920.

[23rd October, 1920.]

BE it enacted by the Governor of British Guiana, with the advice and consent of the Court of Policy thereof, as follows :—

1. This Ordinance may be cited as the Board of Agriculture Ordinance, 1920. Short title.

2. In this Ordinance—

"The Board" means the Board of Agriculture established under this Ordinance. Interpretation of terms

"Agriculture" includes horticulture and forestry.

CONSTITUTION OF BOARD.

3. (1). There shall be established a Board of Agriculture consisting of the Governor, the Director of Science and Agriculture, and such other members hereinafter referred to as ordinary members as shall be appointed by the Governor and every member so appointed shall hold office for three years. Five ordinary members shall form a quorum. Establishment of Board of Agriculture.

(2). The Governor may on the recommendation of the Board appoint any person whether resident in this colony or not to be an honorary member of the Board, but such honorary member shall not have the right of voting at meetings of the Bcard.

(3). The Board may grant such leave of absence to any ordinary member as it thinks fit, but any ordinary member who quits the colony without being granted such leave, or who remains out of the colony after the expiration of

his leave, shall *ipso facto* cease to be a member of the Board.

Chairman of Board.

4. The Governor shall be President and such other person as he may appoint shall be Chairman of the Board, and the Governor may also appoint a Deputy Chairman of the Board. In the absence of President the Chairman and in the absence of the President and of the Chairman the Deputy Chairman shall preside at all meetings of the Board, and in the absence of all three, the ordinary members present at any meeting may elect a Chairman for that meeting. The person presiding at any meeting shall have a casting vote.

Board to be a body corporate.

5. The Board of Agriculture shall be a body corporate, and may sue and be sued, and may for all purposes be described by that name.

Secretary and officers of Board.

6. The Governor may appoint a Secretary and such other officers and Clerks for the Board as may be necessary.

Other Officers of Board.

7. The Board, with the approval of the Governor, may appoint such officers, inspectors, agents or servants as may be necessary for the carrying out of this Ordinance.

Delegation of powers to Committees.

8. The Board may delegate any of its powers to a Committee or Committees of its members, and such delegated powers shall be exercised in accordance with such regulations as the Board may make for the purpose. Any such Committee may, in accordance with such regulations as aforesaid, elect not more than three persons, skilled in the matters delegated to the Committee, not being members of the Board, to be members of the Committee.

Powers and Duties of Board.

Powers and duties of Board.

9. (1.) In addition to the duties imposed and the powers conferred on the Board by any Ordinance passed before or after the coming into operation of this Ordinance the Board shall also undertake the collection and preparation of

statistics relating to agriculture and forestry, and may also undertake the inspection of and reporting on, any schools in which technical instruction practical or scientific, is given in any matter connected with Agriculture or forestry, and the aiding of any school which admits such inspection, and in the judgment of the Board is qualified to receive such aid, and the aiding of any system of lectures or instruction connected with agriculture or forestry, and the inspection of and reporting on any examinations in agriculture or forestry.

(2.) The Board may also make or aid in making such inquires, experiments, and research and collect or aid in collecting such information as they may think important for the purpose of promoting agriculture or forestry.

(3.) The Board shall have the charge and control of the Government Botanical Gardens in Georgetown, and all Forestry and Agricultural Stations in the Colony established by the Government, and all Government Farms.

(4.) The Board may accept the charge and control of any other Botanical or Ornamental Gardens, or pleasure grounds in the colony, and of any Forestry and Agricultural Stations and Farms.

(5.) The Board may make By-laws for the control and management of the Government Botanical Gardens in Georgetown and of any other gardens or grounds and of any Forestry and Agricultural Stations and Farms of which it accepts the charge and control.

(6.) The Board may make regulations—

(*a*) For the holding of Agricultural shows and the management of the same;

(*b*.) For the affiliation to the Board of Local Agricultural Associations, and the Management of the same;

(*c.*) For the examination of Schools in Agricultural and allied subjects;

(*d*) As to the duties of the Secretary and other officers of the Board; and

(*e.*) Generally for the more efficient carrying out of the purposes of this Ordinance.

MISCELLANEOUS.

Proceedings of Board.

10. (1) Every document purporting to be an order, licence or other instrument issued by the Board, and to be signed by the Secretary or other person authorised by the Chairman to act on behalf of the Secretary, shall be received in evidence and be deemed to be such order, licence, or instrument without further proof unless the contrary is shown.

(2.) A certificate signed by the Chairman or any other member of the Board that an order, licence or other instrument purporting to be made or issued by the Board is so made or issued shall be conclusive evidence of the fact so certified.

Financial provisions.

11. The salaries of the Secretary and other officers of the Board and of all persons employed by the Board, and all expenses incurred by the Board in the execution of its duties under this Ordinance, shall be paid out of moneys provided by the Combined Court.

Saving Clause.

12. Wherever in any Ordinance passed before the coming into operation of this Ordinance, the Board of Agriculture Ordinance, 1910, is mentioned or referred to, the Board of Agriculture Ordinance, 1920, shall be deemed to be intended and shall be taken and read in lieu thereof.

Repeal of Ord. 9 of 1910.

13. The Board of Agriculture Ordinance, 1910, is hereby repealed.

Passed the Court of Policy this 24th day of September, 1920.

No. 168.

GOVERNMENT NOTICES.

COLONIAL SECRETARY'S OFFICE,
Georgetown, Demerara,
29th October, 1920

HIS Excellency the Governor has been pleased, under the provisions of section 3 (1) of the Board of Agriculture Ordinance, 1920, to appoint the following gentlemen to be Ordinary Members of the Board as constituted under the provisions of the said Ordinance :—

The Honourable Cecil Clementi, C.M.G., M.A., F.R.G S., Colonial Secretary.
The Commissioner of Lands and Mines.
The Assistant Director of Science and Agriculture.
The Honorary Secretary, the Royal Agriculture and Commercial Society.
The Secretary, Co-operative Societies.
The Superintendent of Botanic Gardens and Agricultural Stations.
The Superintendent of the British Guiana Sugar Planters' Experiment Stations.
The Honorary Secretary, the British Guiana Farmers' Conference.
Benjamin Gainfort, Esquire, Chief Commissary.
Sidney Howard Bayley, Esquire, Superintendent, Onderneeming School.
The Honourable Robert Edward Brassington.
Edgar Beckett, Esquire, F.L.S.
Henry Leathem Humphrys, Esquire.
Thomas Earle, Esquire.
William Martin Bryce Shields, Esquire.
Arthur Ernest Bratt, Esquire.

No. 169. 29th October, 1920.

WITH reference to Government Notice No. 168 of to-day's date, His Excellency the Governor has been pleased, under Section 4 of the Board of Agriculture

Ordinance, 1920, to appoint the Director of Science and Agriculture to be Chairman and the Assistant Director of Science and Agriculture to be Deputy Chairman of the Board.

No. 170

29th October, 1920.

HIS Excellency the Governor has been pleased, under the provisions of Section 6 of the Board of Agriculture Ordinance, 1920, to appoint Edmund Murray Peterkin, Esquire, to be Secretary to the Board as constituted under the provisions of the same Ordinance.

No. 171.

29th October, 1920.

HIS Excelleny the Governor has been pleased, under the provisions of Section 3 (2) of the Board of Agriculture Ordinance, 1920, to appoint the following gentlemen to be Honorary Members of the Board as constituted under the provisions of the said Ordinance:—

Sir Alexander Swettenham, K.C.M.G.
Sir Frederic M. Hodgson, K.C.M.G.
Sir Walter Egerton, K.C.M.G.
Sir Daniel Morris, K.C.M.G., D.Sc.
Sir Francis Watts, K.C.M.G., D.Sc.
J. J. Quelch, Esquire, B.Sc.

By Command,

C. CLEMENTI,
Colonial Secretary.

THE IMPERIAL ENTOMOLOGICAL CONFERENCE.

ORIGIN.

Arrangements were being made for a Conference of the Official Entomologists in the Dominions, India, and the Colonies to be held in London in 1914; but the outbreak of war necessitated the abandonment of the proposal. In 1919 the Secretary of State for the Colonies revived the suggestion, and a Conference was accordingly assembled on the 1st of June, 1920.

DELEGATES.

The following delegates were selected by their respective Governments to attend the Conference :—

Self-Governing Dominions and India.

Mr. C. F. C. Beeson, India.
Dr. C. Gordon Hewitt, Canada.
Mr. C. P. Lounsbury, South Africa.
Dr. R. J. Tillyard, New Zealand.
Professor R. D. Watt, Australia.

Australian States.

Mr. F. Balfour Browne, Queensland.

Colonies not possessing Responsible Government, Protectorates, etc.

Dr. J. B. Addison, Seychelles.
Mr. T. J. Anderson, East Africa Protectorate.
Mr. G. G. Auchinleck, Mauritius.
Mr. H. A. Ballou, Leeward Islands, St. Vincent and Imperial Department of Agriculture for the West Indies.
Mr. G. E. Bodkin, British Guiana.
Mr. L. H. Gough, Egypt.
Mr. C. C. Gowdey, Uganda Protectorate.
Mr. R. W. Jack, Southern Rhodesia.
Mr. H. H. King, Sudan.

Mr. C. P. Lounsbury, Basutoland, Bechuanaland and Swaziland.
Dr. Aylmer May, Northern Rhodesia.
Mr. W. H. Patterson, Gold Coast.
Mr. P. B. Richards, Federated Malay States.
Mr. F. A. Stockdale, Ceylon.
Mr. F. W. Urich, Trinidad.
Mr. H. Waterland, Sierra Leone

Owing to the death of Dr. Gordon Hewitt shortly before he was to leave for England, the Dominion of Canada was unable to send a delegate, but at the request of the Canadian Government, Mr. Lounsbury acted as their representative at the Conference.

PROGRAMME:

The following programme was arranged for the Conference:—

Tuesday, 1*st June*.

Morning.—Reception of delegates by Lord Harcourt.

Business Meeting: "The Work and Finances of the Imperial Bureau of Entomology."

Afternooon.—Meeting of the Zoological Society of London in Regent's Park.

Wednesday, 2*nd June*.

Morning.—Discussion: "Legislation in regard to Plant Pests in the British Empire."

Afternoon.—Papers: "Cotton Pests."
"Organization of Entomological Work in the Sudan."

Evening.—Meeting of the Entomological Society of London., 11, Chandos Street, Cavendish Square.

Thursday, 3*rd June*.

Morning.—Discussion: "The Education of Economic Entomologists."

Afternoon.—Staff Conversazione at the Natural History Museum, South Kensington.

Meeting of the Linnean Society, Burlington House.

Friday, 4th June.

Visit to Rothamsted Experimental Station, Harpenden, Herts, in conjunction with a meeting of the Association of Economic Biologists.

Saturday, 5th June.

Morning.—Discussion: "Tsetse-fly Problem."

Monday, 7th June.

Morning.—Discussion: "Resistance of Plants to Insect Attacks."

Afternoon.—Papers: "Insect Pests of British Guiana."
"Insect Pests of Trinidad."
"Review of the Conditions in the West Indies in regard to Agriculture and Crop Pests."

Tuesday, 8th June.

Visit to Oxford.

Wednesday, 9th June.

Morning.—Discussion: "Artificial versus Natural Methods of Control of Insect Pests."

Afternoon.—Papers: "Insects in relation to Afforestation."
"Insect Pests of Tea in Ceylon."

Thursday, 10th June.

Visit to Cambridge.

Friday. 11th June.

Morning.—Final Meeting of Conference for consideration of resolutions.

Evening.—Official dinner to the Delegates.

PLACE OF MEETINGS.

The Council of the Linnean Society very kindly placed ›ir rooms in Burlington House at the disposal of the nference, and all meetings were held in these rooms.

Opening of Conference.

Morning Session, Tuesday, June 1st.

The Conference assembled on the 1st of June. Viscount Harcourt, Chairman of the Managing Committee of the Imperial Bureau of Entomology, received the delegates and opened the proceedings. After welcoming the delegates he referred to the importance of economic entomology: and to the established fact that the control of insect life spells success in the treatment of disease and in the production of food and other crops.

He explained briefly the position of the Bureau and the need for further funds to meet the increased cost of upkeep, expressing the hope that if on further acquaintance the delegates were satisfied with the attainments of the Bureau during its existence they would commend it on their return to the greater recognition and generosity of their respective Governments.

Work and Finances of Bureau.

At this first meeting of the Conference the subject for consideration was the "Work and Finances of the Imperial Bureau of Entomology." A memorandum prepared by the Director was circulated, and formed the basis of discussion. The Conference approved the lines on which the Bureau had been conducted and expressed their readiness to leave to the Director and the Managing Committee full discretion as to the general scope and contents of the publications of the Bureau.

A special Committee was appointed to examine in detail the question of finance and to submit recommendations.

The Committee eventually met three times, and after detailed examination of the position, arrived at the conclusion that in order to carry on the work of the Bureau satisfactorily on existing lines, a sum of £13,000 per annum must be guaranteed.

Plant Pest Catalogue.

A Sub-Committee was also appointed to consider the question of expediting the completion of the plant pest

catalogue now in preparation by the Bureau, special attention having been directed to this during the discussion on the work of the Bureau. In view of the recommendation made by the Sub-Committee, it was not thought desirable to provide additional staff for the catalogue, but it was understood that as a temporary measure the Director would engage a third clerk to assist with the work, whose salary would be found from savings, or, if necessary, from the reserve, assuming that the general proposals as to the income of the Bureau are accepted.

Rome Convention.

A Sub-Committee was appointed to report to the Conference on the Convention prepared at the International Conference on Phytopathology held at Rome in March, 1914.

Afternoon Session.

This Session was held at the headquarters of the Zoological Society in Regents Park, London N.W. all the Official Delegates were present also a large number of the members of the Society. A general tour of the grounds was made followed by a reception in the rooms of the Society. Several interesting papers were read by members of the Zoological Society. An especially interesting contribution was a paper by Dr. Chalmers Mitchell well illustrated by lantern slides, on what might be termed the "Zoological incidents of an extended aeroplane trip." Dr. Mitchell accompanied two intrepid aviators on a long flight through certain arid and sparsely inhabited parts of Egypt.

Wednesday, June 2nd.

Morning Session.

In the Chair: Dr. R. Stewart Mac Dougall.

Discussion: Legislation in regard to Plant Pests in the Empire.

The Chairman opened the discussion by pointing out that every country had a perfect right to protect itself against the importation of insect pests from other coun-

tries and also against the internal dissemination of pests. Owing to war experiences considerable enlightenment had taken place with regard to popular ideas of the economic importance of insects.

Mr. C. P. Lounsbury (South Africa) urged that the agricultural entomologist should have a large say in shaping such legislation relative to (1). Plant importations (2). Their internal distribution (3). Insect pests suppression. In support of these points he narrated the experiences gained in South Africa. He also pointed out that import restrictions entail constant opposition and often active hostility and that in some countries pest regulations have been used to keep out products for commercial reasons.

Mr. Stockdale (Ceylon) then gave a short review of the condition of such legislation in Ceylon drawing attention to some of the defects thereof.

Dr. L. O. Howard (*V. S. Bureau Entomology*) stated that such legislation was passed to keep out pests and not for any commercial purpose They believed in stringent prohibition and no risks.

Dr. Tillyard (New Zealand) said that in his country the only way to deal with pests was to introduce their enemies from another country. This could not be done owing to the absolute prohibition against insect importation at present existing. This was a good instance of the necessity of such regulations being handled by the entomologists themselves.

Mr. H. A. Ballou (Barbados) remarked on the fact that small colonies like Barbados could only maintain a few highly trained men. He also instanced the fumigation of ships by Clayton gas in Barbados and the inadequacy of the process which was recently proved by its failure to kill a ship's cat which had accidentally become imprisoned in the hold under fumigation. Such legislation in Barbados amounted in its execution to a matter of filling up forms.

Prof. R. D. Watt (Australia) testified as to the desirability of having well trained men to perform such work.

After several other gentlemen had spoken the Chairman proceeded to summarise the various points that had been raised. He suggested that it was evident that certificates by themselves were of but little value. A trained body of supervisors were necessary in each country. A Sub-committee was then formed to consider the desirability of a Rome Convention or an Empire Convention in the matter of dealing with insect pests.

Afternoon Session.

In the Chair: LIET. COLONEL SIR DAVID PRAIN. C.I.E., C.M.G., F.R.S.

Mr. H. A. Ballou Read an interesting paper concerning the insect pests of cotton in the West Indies. Much of the information given in this paper has necessarily appeared previously in the publications of the Imperial Department of Agriculture, Barbados.

Dr. L. Gough (Egypt) gave a condensed account of the insect pests of cotton in Egypt and measures adopted for their control. Later, a number of questions were asked Mr. Ballou, to which he gave answers, concerning the spread of black scale from wild plants to the cultivated cotton and the breeding of cotton stainers.

Mr. Harold King (Sudan) then read his paper "The organisation of entomological work in the Anglo-Egyptian Sudan", which proved of very considerable interest. A valuable discussion ensued in which a letter from Mr. Ballard of Coimbatore, India, was read which suggested an Imperial Entomological service with headquarters in London. A staff of Entomologists would be maintained which could be sent here and there, as the demand arose to work on particular problems. Prof R. Newsted raised an excellent point by remarking that the chief entomologists should run both agricultural and medical entomology. Dr. L. O. Howard deprecated the growing custom

of treating economic entomology as a subsidiary branch of phytopathology.

In the evening a meeting of the Entomological Society of London was attended.

(*To be continued.*)

N.B. In our next issue we hope to conclude this report, publish a general review of the work of this conference and the paper read by British Guiana's official delegate. Editor.

A SURE TEST.

Plants and weeds are as certain an indication of the deficiency or abundance of lime as if a chemical analysis were taken; in fact, they may be considered as even more reliable.

Where is this point always to remember with regard to land deficient in lime: No manurial dressing can exercise its full benefit unless the land contains enough lime to keep it in healthy condition for the working of the soil bacteria, and applications of lime on such soils, although they may produce little immediate effect on the crop to which they are applied, will undoubtedly in the increased results from subsequent dressings of manure. One rule, however, there is to which attention should be called: lime should be used in small quantities as often. It is a greivious mistake to apply a large dressing and then imagine that no more will be needed for many years to come.—SOUTH AFRICAN SUGAR JOURNAL, Vol. 4. No. 8.

Below is a table showing the day of the year 1920 during which the greatest precipitation of rain took place and the amount thereof, also the day on which the highest shade temperature was recorded. These figures refer to Georgetown (Botanic Gardens), New Amsterdam (Botanic Gardens) and Onderneeming (Industrial School). No temperature records were kept at Morawhanna (Police Compound) North West District.

Stations.	Wettest Day.	Rainfall.	Hottest day.	Temperature.
Georgetown ...	31st Jany.	4·00 ins....	22nd Oct. 11th & 13th Nov.	89·5
New Amsterdam	9th July	2·73 ins....	1st, 6th–11th Jan. 10th, 12th–15th, 22nd & 28th Feb. 7th, 13th, 15th, 18th, 19th, 21st, 27th, 29th & 31st Oct.	96·0
Onderneeming...	8th Jany.	3·33 ins....	25th Sept. 22nd Oct.	92·0
Morawhanna ...	24th Jany.	5·74 ins....	No records	kept.

AIR TEMPERATURE AND HUMIDITY IN THE SHADE, BOTANIC GARDENS, GEORGETOWN, 1920.

	Air Temperature.			Humidity.
	Maximum.	Minimum	Mean.	Mean.
January ...	84·0	74·8	79·4	81·0
February ...	83·5	74·3	78·9	80·3
March ...	84·0	74·8	79·4	75·3
April ...	85·3	75·6	80·5	73·5
May... ..	85·1	75·4	80·2	79 4
June ...	84·2	75·0	79·6	81·4
July	84·7	74·8	79·7	83·7
August ...	86·2	75·4	80·8	79·6
September ..	86·7	75·4	81·0	77·2
October ...	87·7	76·1	81·9	76·1
November ...	87·3	76·2	81·7	77·8
December ...	84·6	75·5	80·0	80·1
Mean	85·3	75·3	80·3	78·8

By comparison with the figures for a normal year the maximum air temperatures agree fairly well. The exception occured during November which was considerably above the average.

The minimum air temperature in the shade was somewhat higher than the normal during October and November. The humidity was greatest in July and least in April.

Meteorological Data—1920.

BOTANIC GARDENS—GEORGETOWN.

Months.	Rain-fall.	Number of days of rain.						EVAPORATION
	Inches.	Under ·10 Inches	·10 to ·50 Inches	·50 to 1.00 Inches	1.00 to 2.00 Inches	Above 2.00 Inches	Total Days	Inches
January	16.40	4	8	1	1	4	18	3.94
February	6.38	8	8	...	3	...	19	4.46
March	1.93	8	7	...	...	...	15	6.21
April	1.12	7	4	...	...	..	11	6.68
May	4.78	11	8	1	1	...	21	5.16
June	11.54	4	7	5	5	...	21	3.88
July	6.84	5	11	5	...	...	21	4.46
August	5.53	4	8	3	1	...	16	5.14
September	2.85	3	5	2	...	...	10	5.57
October	1.22	6	5	...	...	...	11	5.96
November	3.80	2	7	2	1	...	12	5.14
December	12.27	9	8	4	3	1	25	4.99
Totals	74.76	71	86	23	15	5	200	60.69

The rainfall during 1920 was characterised by being well below that of a normal * year. It varied in the following respects:—An abnormally wet January was succeeded by a normal February. The precipitation in March and April was, comparatively speaking, less than usual May was almost as abnormal as January, being exceedingly dry by comparison with the standard. June, however, was up to the average. The usual dry weather set in towards the end of August and persisted almost to the end of November. The rainfall in December was above the average.

*The rainfall, temperature and humidity figures which we have taken to constitute a normal year will be found in the report on Meteorology for the calendar year 1916, which is included in the 1916 Annual Report of the Department of Science and Agriculture, British Guiana. They are the averages of the rainfall, etc., records for the period 1846-1916.

ATTENDANCES AT THE DISTRICT GARDENS

Year.	Bourda.	Belfield, E. Coast.	Stanleytown, New Amsterdam.	Suddie, Essequibo.	Den Amstel.	Houston, E. Bank.	Wakenaam.	Total Attendances.
1912 ...	5,514	4,395	3,302	2,100	2,544	2,156	718	21,729
1913 ...	5,156	4,535	2,519	3,399	2,568	1,836	1,319	21,332
1914 ...	4,243	3,869	2,443	3,025	1,791	1,653	1,533	18,577
1915 ...	1,123	1,006	769	59	503	339	401	4,200
1916 ...	4,705	1,161	1,510	225	623	2,251	1,297	12,026
1917 ...	4,991	2,820	1,366	3,297	1,186	2,564	1,663	17,886
1918	4,834	3,081	1,653	2,671	2,162	2,790	2,067	19,258
1919	4,769	2,425	1,582	2,798	1,851	2,480	1,556	17,461
1st Quarter	1,235	749	445	397	595	840	483	4,834
2nd Quarter	1,792	560	489	723	790	976	709	6,039
3rd Quarter	1,455	364	229	597	429	600	366	4,040
4th Quarter	1,803	649	502	708	718	812	590	5,782

Total attendances—1920, 20,695.

EXPORTS OF AGRICULTURAL AND FOREST PRODUCTS.

Below will be found a list of the Agricultural and Forest Products of the Colony exported during 1920. The corresponding figures for the two previous and the average for the four years previous to that are added for convenience of comparison.

Product.	*Average 1914-17.*	*1918.*	*1919.*	*1920.*
Sugar, tons ...	90,184	93,901	83,139	83,765
Rum, gallons	3,505,121	2,614,481	4,342,769	1,772,178
Molasses, gallons	46,572	208,262	171,249	420
Cattle-food, (Molascuit) tons	1,870	2,754	2,023	1,783
Cacao, cwts. ...	301	85	85	216
Citrate of Lime, cwts.	190	31	388	63,982
Lime Juice, gals.	6,462	13,846*	10,238†	6,001‡
Essential Oil of Limes, gals.	135	180	826	817
Coconuts, thousands	1,669	1,516	4,693	2,621
Copra, cwts. ...	1,562	2,487	1,367	296
Coffee, cwts. ...	2,358	4,751	8,362	3,642
Kola-nuts, cwts. ...	14	24	None	9
Rice, tons ...	9,666	8,017	6,942	8,094
Ricemeal, tons ...	192	81	None	None
Cattle, head ...	755	332	4	4
Hides, No. ...	3,465	3,291	7,562	5,985
Pigs, No. ...	904	None	None	None
Sheep, head ...	48	10	None	66
Balata, cwts. ...	9,901	10,185	12,546	9,595
Charcoal, bags ...	49,902	41,310	41,380	47,620
Firewood, Wallaba, etc., tons ...	8,256	7,260	6,846	4,852
Gums, lbs. ...	470	60	2,338	3,521
Lumber, cub. ft. ...	222,318	116,771	234,882	297,763
Railway sleepers, No.	11,910	7,743	5,458	14,704
Rubber, cwts. ...	106	214	158	182
Shingles, thousands	2,019	2,842	3,277	2,589
Timber, cub. ft. ...	105,862	31,082	101,383	68,200
Coconut Oil, gals....	16,670	30,652	9,129	20,093

*Raw Juice—12,996 gals....Concentrated— 849 gals.
†Raw Juice— 2,882 gals. ...Concentrated—7,356 gals.
‡Raw Juice— 2,400 gals....Concentrated—3,601 gals.